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EXAMINER	
MEROUAN, ABDERRAHIM	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/593,673	Applicant(s) PAASO, JUHA	
	Examiner ABDERRAHIM MEROUAN	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 20 September 2006.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 20 September 2006 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 9-11 are rejected under 35 U. S. C. 101 because the claimed invention is directed to non-statutory subject matter as follows:

Claims 9-11 recite a distribution readable medium. The distribution readable medium in claim 9-11 could be interpreted as "signals" since the specification doesn't specify what is the distribution readable medium. Signals also fail to fit any of the four statutory classes of invention.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

> such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5-7, 9-11, are rejected under 35 U.S.C. 103(a) as being unpatentable over MacPherson (US-PGPUB 20020184245 A1) Hereinafter referred as MacPherson, in view of Mao (US-Patent 6307558 B1), hereinafter Mao

5. As per claim 1, MacPherson discloses: A method for processing a computer aided polygon model, comprising:

forming a vertex array which is linear and static and comprises the vertices of the image elements of the polygon model (MacPherson, Paragraph[0015], lines 1-12, "The vertex array contained a numbered element is linear , and also static since it contains the coordinate of a 3D mesh"); forming an index array which is linear and the elements of which determine the image elements of the polygon model by pointing at the vertices of the image elements in the vertex array(MacPherson, Paragraph[0018], lines 1-6, " ...numbered elements…: are elements characterized with an index"), and which index array comprises an active part, the image elements determined by the elements of the active part being included in the polygon model part to be presented graphically (MacPherson, Paragraph [0019], lines 1-9)

MacPherson doesn't disclose:

forming additionally a hierarchical data structure whose hierarchy is based on the division of the vertices in the image space, the nodes of which hierarchical data structure point at nodes of a lower level in the hierarchy, the leaf nodes of the hierarchical data structure pointing at elements of the active part of the index array; and reducing the polygon model part to be presented graphically by means of the hierarchical data structure, maintaining the linearity of the index

array. However, Mao discloses: forming additionally a hierarchical data structure whose hierarchy is based on the division of the vertices in the image space (Mao, Column 3, lines 5 - 14,"... Node of the tree represents individual models of 3D objects... " the models represent the division of the vertices in the image.), the nodes of which hierarchical data structure point at nodes of a lower level in the hierarchy (Mao, Column 3, lines 46-55, also" for each mesh , generate levels of details...(see Figure 4, block 62)"), the leaf nodes of the hierarchical data structure pointing at elements of the active part of the index array (Mao, Column 4, lines 46-50, " since the tree is searchable it has address for each leaf"); and reducing the polygon model part to be presented graphically by means of the hierarchical data structure, maintaining the linearity of the index array (Mao, Column 3, lines 24-48).

It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Mao into the process taught by MacPherson, because through such incorporation would provide an efficient data storage.

6. As per claim 2, MacPherson discloses: A method according to claim 1, wherein reducing the polygon model comprises: including the location information representing the vertices pointed at by the index array elements pointed at by said at least two leaf nodes in a node of an upper level in the hierarchy, whereby this upper level node becomes a leaf node; and (MacPherson, Paragraph [0028], lines 1-6) removing at least one element of the index array pointed at by said at least two hierarchically equal leaf nodes from the active part. (MacPherson, Paragraph [0020], lines 1-6)

MacPherson doesn't disclose: removing at least two hierarchically equal leaf nodes from the hierarchical data structure. However, Mao discloses: removing at least two hierarchically equal leaf nodes from the hierarchical data structure (Mao, Column 6, lines 4-9).

7. As per claim 3 MacPherson discloses: A method, further comprising forming an index array in such a way that the index array also comprises a passive part, the vertices pointed at by the elements of the passive part belonging outside the polygon model part to be presented graphically; and (MacPherson, Paragraph [0022], lines 1-8) reducing the polygon model part by moving at least one index array element from the active part to the passive part. (MacPherson, Paragraph [0025], lines 1-7)

8. As per claim 5, the arguments used to reject 1 are analogous to argument used to reject claim 5

9. As per claim 6, the arguments used to reject 2 are analogous to argument used to reject claim 6

10. As per claim 7, the arguments used to reject 3 are analogous to argument used to reject claim 7

11. As per claim 9, the arguments used to reject 1 are analogous to argument used to reject claim 9

12. As per claim 10, the arguments used to reject 2 are analogous to argument used to reject claim 10

13. As per claim 11, the arguments used to reject 3 are analogous to argument used to reject claim 11

15. Claims 4, 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacPherson (US-PGPUB 20020184245 A1) Hereinafter referred as MacPherson, in view of Mao (US-Patent 6307558 B1), hereinafter Mao, as applied to claim 1 above, and further in view of Pentkovski et al. (US-PGPUB 20020008698 A1), hereinafter Pentkovski

16. As per claim 4, MacPherson in view of Mao discloses: A method according to claim 1, wherein forming a hierarchical data structure comprises (Mao, Column 3, lines 5 -14): MacPherson in view of Mao doesn't disclose: dividing the coordinate space represented by the polygon model into hierarchical sectors on the basis of vertices contained in the vertex array; including the pointers of the nodes corresponding to the sectors of the next lowest level in the hierarchy in the node corresponding to each hierarchical sector; including the pointers pointing at the index array elements pointing at the vertices determining the lowest hierarchical sector in the leaf nodes. However, Pentkovski discloses: dividing the coordinate space represented by the polygon model into hierarchical sectors on the basis of vertices contained in the vertex array; (Pentkovski, Paragraph[0043], lines 1- 6) including the pointers of the nodes corresponding to the sectors of the next lowest level in the hierarchy in the node corresponding to each hierarchical sector; (Pentkovski, Paragraph[0044], lines 1- 4) including the pointers pointing at the index array elements pointing at the vertices determining the lowest hierarchical sector in the leaf nodes. (Pentkovski, Paragraph [0045], lines 1- 4)

It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Pentkovski into the process taught by MacPherson in view of Mao, because through such incorporation would provide an easy management of image elements storage.

17. As per claim 8, the arguments used to reject 4 are analogous to argument used to reject claim 8.

18. As per claim 12, the arguments used to reject 4 are analogous to argument used to reject claim 12.

Response to Arguments

19. Applicant’s arguments directed to claims 1-12 have been fully considered but they are not persuasive.

20. In response to applicant’s argument for claim 1, applicant argues on page 1 that the combination of the prior art doesn’t disclose:” …hierarchical data structure whose hierarchy is based on the division of the vertices in the image space, " Examiner respectfully disagrees with the argument because MacPherson in view of Mao stated that:: “4) An embodiment of the present invention operates within a 3D graphics application, which creates and manages a scene graph stored in a graphical database. A scene graph is a data structure used to store a scene. A

scene graph is typically structured as a tree, or more specifically, a directed acyclic graph (DAG). Nodes of the tree represent individual models of 3D objects present in a scene. The scene graph may comprise multiple complex, highly detailed polygonal surfaces or meshes arranged in a hierarchical manner." (see : Mao, Column 3, lines 5 -14,"... Node of the tree represents individual models of 3D objects... " the models represent the division of the vertices in the image.)

21. In response to applicant's argument for claim 1, applicant argues on page 1 that the combination of the prior art doesn't disclose:" the nodes of which hierarchical data structure point at nodes of a lower level in the hierarchy "Examiner respectfully disagrees with the argument because MacPherson in view of Mao stated that: FIG. 2 is a diagram of the sample scene graph of FIG. 1 wherein the meshes have associated least level of detail polygon reduction ratios (LPRRs) as determined at block 60. (6) Next, for each mesh in the scene, levels of detail (LOD) variables for each instance of the mesh may be generated using the mesh's LPRR at block 62. Each set of LOD variables may used with a discrete level of detail or instance of a mesh. In one embodiment, the LOD variables comprise a "switch in distance" and a mesh polygon reduction ratio (MPRR)." (see: Mao, Column 3, lines 46-55, also" for each mesh , generate levels of details...(see Figure 4, block 62)"),

22. In response to applicant's argument for claim 1, applicant argues on page 1 that the combination of the prior art doesn't disclose:" the leaf nodes of the hierarchical data structure pointing at elements of the active part of the index array". Examiner respectfully disagrees with

the argument because MacPherson in view of Mao stated that: "A leaf node stores the surface area and polygon density of a mesh at a volume within the scene. An octree may be used because it can be searched more quickly than other data structures, however, in other embodiments, other data structures may be used." (see: Mao, Column 4, lines 46-50, " since the tree is searchable it has address for each leaf");

23. In response to applicant's argument for claim 1, applicant argues on page 1 that the combination of the prior art doesn't disclose:" reducing the polygon model part to be presented graphically by means of the hierarchical data structure, maintaining the linearity of the index array" Examiner respectfully disagrees with the argument because MacPherson in view of Mao stated that:" FIG. 4 is a flow diagram of hierarchical static scene simplification according to an embodiment of the present invention. An embodiment of the present invention concurrently simplifies a plurality of objects in a scene represented by a hierarchical scene graph. This solves the problem of overall scene simplification instead of merely simplifying individual meshes without regard to the impact of such mesh simplifications on the scene as a whole. For a hierarchical scene graph made up of a plurality of polygonal meshes, and using a user-specified scene polygon reduction ratio (SPRR), each mesh's initial least level of detail polygon reduction ratio (LPRR) may be determined at block 60. The SPRR comprises a user-specified or predetermined parameter of how much the overall scene should be simplified. Each mesh of the scene includes a LPRR parameter for specifying how much an individual mesh should be simplified within the context of the scene. Once a mesh's LPRR has been determined, the mesh should be simplified to this ratio. When the LPRR is lower, the mesh may be simplified to a

greater degree and fewer polygons are in the resulting mesh. When the LPRR is higher, the mesh may be simplified to a lesser degree and more polygons are in the resulting mesh. FIG. 2 is a diagram of the sample scene graph of FIG. 1 wherein the meshes have associated least level of detail polygon reduction ratios (LPRRs) as determined at block 60." (see :Mao, Column 3, lines 24-48).

Conclusion

24. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ABDERRAHIM MEROUAN whose telephone number is (571)270-5254. The examiner can normally be reached on Monday to Friday 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on **(571) 272-7761**. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Abderrahim Merouan/

Examiner, Art Unit 2628

/XIAO M. WU/

Supervisory Patent Examiner, Art Unit 2628